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10/623,646	07/22/2003	Chia-Chen Chen	0941-0794P	4737

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EXAMINER	
BROOME, SAID A	
ART UNIT	PAPER NUMBER
2628	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/623,646	Applicant(s) CHEN ET AL.	
	Examiner Said Broome	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 June 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed 6/29/2007.

2. Claims 1 and 5 have been amended by the applicant.

3. Claims 2-4 and 6-8 are original.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al.(hereinafter "Lee", "*Fast head modeling for animation*") in view of Migdal et al.(hereinafter "Migdal", US Patent 6,208,347).

Regarding claim 1, Lee teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation (page 1 1st paragraph lines 1-5: "*We present a method to reconstruct 3D facial model for animation… from range data…It is based on extracting features on a face…and modifying a generic model with detected feature points.*", and in the feature detection step of Figure 1), comprising using a computer to perform the steps of: (a) inputting original 3D model data (page 2 section 2 1st paragraph lines 1-2, Figure 1); (b) building 3D feature-lines according to the original 3D model data (progression form Figure 3(a) to Figure 3(b)); (c) converting the 3D feature-lines into 3D threads having respective pluralities

of connection joints, connection lines, and loops (page 3 section 2.2 1st paragraph lines 6-9: "*To get correspondence between points from...points on a generic model...a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake...*", Figure 3(b)); and (f) projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model (page 6 section 2.3.2 1st paragraph lines 1-6 and page 7 lines 8-9: "*Some of feature points are chosen for a fine modification...We collect feature points...of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points...Figure 5 (c) is the final result after fine modification.*"), where the captured feature points forming the triangular grid (Figure 5(a)) are projected onto the original model (Figure 4(a)) in order to generate the reconstructed model (Figure 5(c)). Lee fails to teach determining and redetermining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, producing a regular triangular grid sample model according to the 3D threads. Migdal teaches (d) determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads (column 22 lines 38-47: "*...as 6D data points are added to or removed from the mesh, the faces of the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change...When such alterations occur, the computer system 3 must calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces.*" and in column 27 lines 22-26: "*...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density...*"), where the number of points, or density, that comprise the interconnecting lines of the mesh, is determined for the displayed mesh as connecting joints and loops connected through

the vertices are added and deleted; (e) producing a regular triangular grid sample model according to the 3D threads (column 7 lines 42-45: "*The use of the complex data points allows the modeling system to incorporate into the wire frame mesh both the spatial features of the object…*" and in column 3 lines 21-26: "*A typical 3D object modeling system processes the 3D point data to create a "wire-frame" model that describes the surface of the object and represents it as a set of interconnected geometric shapes…such as a mesh of triangles…*", Figures 2g and 5), where the structure of the wire frame mesh of threads have an associated triangle meshed surface; and (g) redetermining sample numbers for each connection line, readding or redeleting the loops, and repeating steps (e) and (f) if the reconstructed 3D model does not satisfy resolution requirements, and outputting the reconstructed 3D model if the reconstructed 3D model satisfies the resolution requirements (column 27 lines 22-40: "*…incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density of resolution…*"), where the density of the mesh is continually calculated or redetermined until the desired resolution is reached. It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Lee with Migdal because this combination would provide accurate reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature points, whereby the structure of the 3D model is efficiently maintained despite changes to the mesh surface.

Regarding claims 2 and 6, Lee teaches that the 3D feature-lines are based on the exterior appearance and structure of the original 3D model (page 2 2nd paragraph lines 1-4: "*…a fast method applied to two kinds of input to get an animatable cloning of a person. A semiautomatic*

feature detection is described to get rough shape of a given face from orthogonal picture data or range data..."), and can be seen in the transition of Figure 1 from the range data to the feature extraction section where the outer structure of the 3D model is captured.

Regarding claims 3 and 7, Lee teaches searching the connection lines (page 3 section 2.2 1st paragraph lines 1-2 and 8-9: "*We provide a semi-automatic feature point extraction method with a user interface...Above the conventional snake, we add some more functions called as structure snake...*"), where the feature points are detected from the input data, therefore all the feature points are searched and then utilized to construct closed zones as loops (Figure 3(b)). Though Lee teaches generating feature lines (Figures 3(b) and 4(b)), Lee fails to teach obtaining intersection points of the 3D feature-lines as the connection joints and recording the connection lines connecting to each connection joint. Migdal teaches obtaining intersection points of the 3D feature-lines as the connection joints (column 12 lines 27-41: "*For 3D mesh constructions, FIG. 1 depicts a plurality of data points 2a (which can be a "cloud of points" or a mesh with some connectivity information...the plurality of data points 2a will also have connectivity or other additional data associated with it...*"), where all the points comprised in mesh are obtained along with their respective connectivity information, which would describe how the points and their respective connection lines are interconnected. Migdal also teaches recording the connection lines connecting to each connection joint (column 9 lines 26-29: "*...the "connectivity" of the mesh or the interconnection of the edges...*" and in column 19 lines 35-40: "*The mesh data structure 144 maintains information for each mesh face, its vertices, edges and neighboring faces. The mesh data structure 144 contains a plurality of face records (e.g., 145)...*"), where the

connection lines, or edges are stored for the mesh. The motivation to combine the teachings of Lee and Migdal is equivalent to the motivation of claim 1.

Regarding claims 4 and 8, Lee illustrates combined closed regular triangular grids of the loops as the regular triangular grid sample model (Figure 5(a)). However, Lee fails to teach the remaining limitations. Migdal teaches constructing regular triangular grids in each loop according to the sample numbers of each connection line (column 27 lines 22-26: "*...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density...*" and in column 9 lines 23-29: "*...the present system and method maintains an optimal structure at all times...Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh (e.g., the triangular mesh...*"), where points are inserted into the triangular grid, and the mesh is therefore continually formed based on the density or sample numbers of the mesh (progression from Figures 2c to 2d). The motivation to combine the teachings of Lee and Migdal is equivalent to the motivation of claim 1.

Regarding claim 5, Lee teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation (page 1 1st paragraph lines 1-5: "*We present a method to reconstruct 3D facial model for animation...from range data obtained from any available resources. It is based on extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points.*") comprising using a computer to perform the steps of: inputting original 3D model data (page 2 section 2 1st paragraph lines 1-2: "*...to give an animation structure to a given range data.*", Figure 1); building 3D feature-lines

according to the original 3D model data (Figure 3(b)); converting the 3D feature-lines into 3D threads having respective pluralities of connection joints, connection lines, and loops (page 3 section 2.2 1st paragraph lines 6-9: "*To get correspondence between points from pictures and points on a generic model, which has a defined number, a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake…*", Figure 3(b)); and projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model (page 1 1st paragraph lines 1-8: "*…extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points. Then the fine modifications follow if range data is available…The reconstructed 3D-face can be animated immediately…*" and on page 6 section 2.3.2 1st paragraph lines 1-6 and page 7 lines 8-9: "*Some of feature points are chosen for a fine modification…We collect feature points only when their positions on a modified head are inside certain limitation of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points…Figure 5 (c) is the final result after fine modification.*"), where the captured feature points forming the triangular grid (Figure 5(a)) are projected onto the original model (Figure 4(a)) in order to generate the reconstructed model (Figure 5(c)). Lee fails to teach determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, producing a regular triangular grid sample model according to the 3D threads. Migdal teaches determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads (column 22 lines 38-47: "*…as 6D data points are added to or removed from the mesh, the faces of the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change…When such alterations occur, the computer system 3 must*

calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces." and in column 27 lines 22-26: "*...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density...*"), where the number of points, as well the density that is directly affected by the sample numbers of those points, are determined for the displayed mesh; producing a regular triangular grid sample model according to the 3D threads (column 7 lines 42-45: "*The use of the complex data points allows the modeling system to incorporate into the wire frame mesh both the spatial features of the object...*"); and outputting the reconstructed 3D model. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Lee with Migdal because this combination would provide accurate reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature points, whereby the structure of the 3D model is efficiently maintained despite changes to the mesh surface.

Response to Arguments

Applicant's arguments filed 6/29/07 have been fully considered but they are not persuasive.

The 35 U.S.C. 112 first and second paragraph rejections of claims 1-8 has been withdrawn.

The 35 U.S.C. 101 rejections of claims 1-8 has been withdrawn.

The applicant argues that the references Lee in view of Migdal used in the 35 U.S.C. 103(a) rejection of claim 1 do not teach the reconstruction of a regular 3D model from an original 3D model. However, Lee teaches reconstruction of a regular 3D model from an original 3D model (page 6 section 2.3.2 1st paragraph lines 1-6 and page 7 lines 8-9), where feature points (Figure 4(b)) of a model are reconstructed (Figure 4(c)) from original 3D model data (Figure 4(a)).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., in the applicant's remarks on pg. 12 1st ¶ lines 5-6: "...a locked-position reconstructed 3D model..." and on pg. 12 2nd ¶ lines 8-10: "...method of adjusting resolution of the reconstructed 3D model without changing the original feature lines...is clearly absent for the utilized references.") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Said Broome/
Art Unit 2628
8/24/07

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER